

# MAGNETIC INDUSTRIAL SHIFT REGISTER

## ASSEMBLY

MODEL ISR-12-100-P-12

### FEATURES

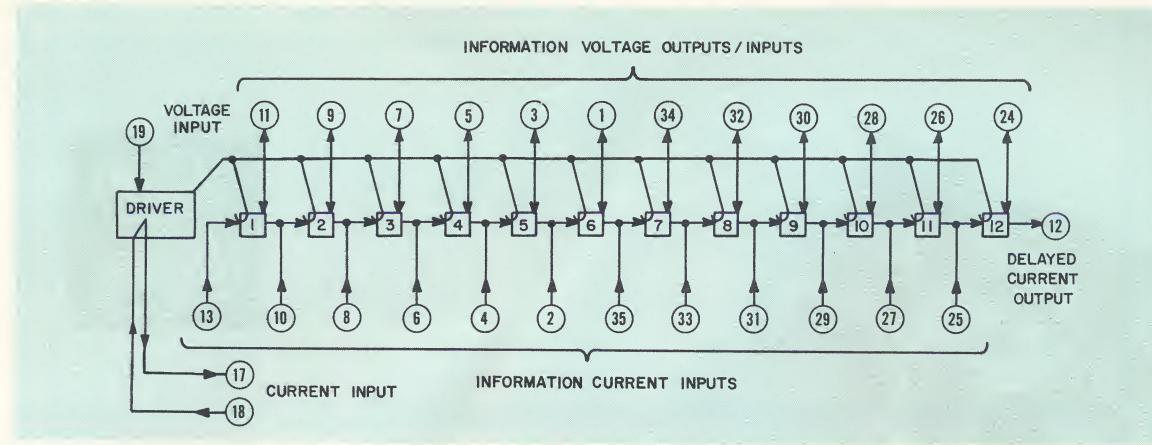
- Magnetic Reliability and Noise Immunity
- Low Cost in Price and Design Time
- Data Not Lost with Power Shut Down
- Low Component Count
- Tolerant of Supply Variations
- Thoroughly Proven DI/AN Register Circuits
- Voltage or Current Outputs
- Flexibility — Separate input and outputs for each Stage

### FUNCTIONS

The circuits of the ISR card are one-core-per-bit, (single phase) elements with a transistor for each element to normalize the pulse and permit flexible connection over wide temperature and voltage margins. The card is used for counting, sorting and digital storage and delay in industrial materials handling, machine control and bookkeeping systems. It is especially valuable where high reliability and low cost are important factors. In conjunction with DI/AN CTLA Logic Assemblies, it provides a complete logic system capability requiring only two stock cards. The inputs and outputs of each of the 12 stages are available at the connector to permit parallel-to-serial or serial-to-parallel format conversion. By simple interconnections, the registers may be cascaded directly, without limit, for increased capacity. No additional components are needed to make a functional equipment.

### DESCRIPTION

THE INDUSTRIAL SHIFT REGISTER CARD MODEL ISR-12-100-P-12 consists of 12 magnetic shift register stages with compatible driver mounted on a single plug-in card. Except for the potted cores, open circuit construction is used throughout to minimize cost. Components are mounted on an epoxy fiberglass etched circuit card with 35 phosphor-bronze, silver-plated and gold flashed ELCO connector pins. Individual mating connectors and standard housings capable of holding 21 or 42 cards are available. Connectors will be mounted in the housings by DI/AN at a nominal charge. Back boards and rear apron connectors will be wired to order.



## BLOCK DIAGRAM — INDUSTRIAL SHIFT REGISTER

## OPERATION OF ISR CIRCUITS

The ISR circuit is electrically identical to that of the well-known DI/AN CTR-100 module. An operating cycle has three parts: Shift, Delay, Input. A shift pulse is applied simultaneously to all cores in a register. Those cores magnetized in the ONE state are switched by the shift pulse to the ZERO state. Switching from ONE to ZERO supplies drive current to a PNP transistor amplifier (See Schematic) which, in turn, loads the delay network. After the switching cycle is complete, the energy in the delay network appears at the output as a current pulse of the correct polarity to set the following core to the ONE state. Those cores initially magnetized in the ZERO state are not switched by the shift and no output appears. A following stage will thus be set to ONE if, and only if, the previous stage was in the ONE state before the shift pulse occurred. The entire pattern of ONE's and ZERO's is therefore moved one stage by each shift pulse. The first stage may be set to ONE by an appropriate input at any time between shift pulses. The Driver, which supplies shift current to the register stages, is similar to a register circuit except that it is returned to the ONE state after each shift pulse by a bias winding. It also incorporates a more complicated two-stage amplifier that permits a voltage input, as well as a current input, to trigger the driver. The diagram shows the logical interconnection and all pin connections for the twelve shift register stages and driver.

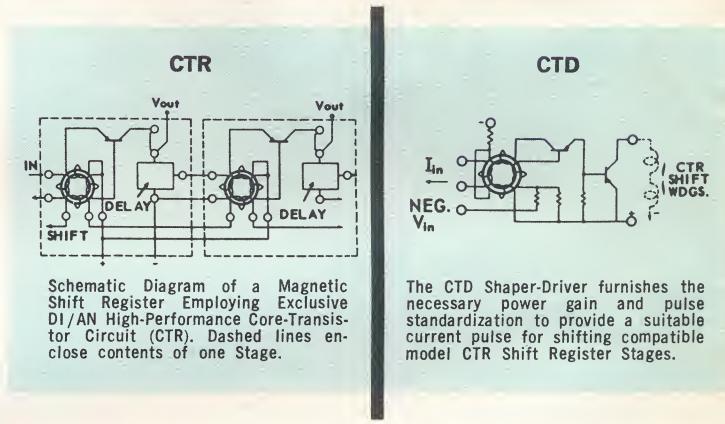
## RELIABILITY

The long proven Reliability of the 100 KC shift register circuit arises from three principal facts.

1. Non-critical use of the transistor permits considerable Beta drift and a tremendous increase in leakage before the performance of the circuit is affected.
2. The circuit is intrinsically resistant to noise from relays, circuit breakers, etc., because of its very low impedance and limited operating speed.
3. Momentary power losses do not affect the state of the system. This can be of great significance in machine control or in the sorting of expensive products.

## ACCESSORIES

- Mating Connector Model EV-35
- Housing Model UL-12-1H (21 cards)



## SPECIFICATIONS

Dimensions: 5 $\frac{5}{32}$  x 6 inches

Mounting holes

Shift Rate: 0 to 100 KC

**Power Requirements:** 12 V DC  $\pm$  15%

**Register Input:** A Current Pulse of 15 ma for approximately 5  $\mu$ sec or not less than 6 ma for 10  $\mu$ sec or more.

Register Outputs: A Current Pulse of 25 ma peak, approximately 4  $\mu$ sec at  $\frac{1}{2}$  amplitude.

and  
A Positive-Going Voltage Pulse of amplitude equal

### Driver Inputs:

Current Input: 100 ma pulse of approximately 1.5  $\mu$ sec duration.

on

Voltage Input: 10 volt, 0.5 to 1.0  $\mu$ sec negative-going pulse from positive supply into 1000 ohms.

## OPERATIONAL LIMITS

- $-20^\circ \text{ C}$  to  $+40^\circ \text{ C}$  at rated frequency
- Humidity over temperature range is 100% without condensation
- Current on any one winding limited to 100 ma average current